

### Abstract

The invention provides a probe for detecting a highly ordered structural site of a nucleic acid of a gene by specifically binding with the structural site to generate an electrochemical response. The inventive probe comprises a cyclic ligand containing ferrocenyl group and a DNA threading intercalating moiety, such as 1, 4, 5, 8-tetrasubstituted naphthalene, 9, 10-disubstituted anthracene, and 1, 5-disubstituted anthraquinone. Current of the cyclic ligand is not observed due to interaction such as stacking or so called charge transfer between ferrocenyl group and the DNA threading intercalating moiety in conventional electrolyte. The binding of the ligand with a highly ordered structural site of a single stranded nucleic acid, where nucleic base inserts between the cavity of cyclic ligand, inhibits the intramolecular interaction of the ligand to convert the ligand into its electrically active form, and as a result, current is observed.